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Highway Maintenance Staff Receive Training on Weather Resources and interpretation

Last September and October, about 125 Washington State Department of Transportation highway operations maintenance staff participated around the state in 4-hour training sessions on the availability, meaning, and use of weather information and resources.

Rick Steed, Research Meteorologist at the University of Washington, conducted the sessions in Cle Elum, Shoreline, Spokane, Tumwater, and Wenatchee for maintenance supervisors and lead technicians. The classes were part of WSDOT's rWeather project, for which Steed also developed a pavement temperature forecast model for the Traffic and Weather website.

Training topics

The classes presented basic information about on-line current and forecast weather resources. Current weather can be observed through recorded weather observations, satellite images, and radar images, and participants learned how they could interpret that information.

Also discussed were both the meteorologists' and computer model forecasting resources available to help participants anticipate weather.

Another topic was how air temperature, air humidity, and pavement temperature data can be combined to help participants determine current road conditions.

"Every group seemed to have a good grasp of how weather affects the pavement," Steed said. "On-line information can confirm what their experience and intuition tells them, helping them estimate whether frost or black ice will occur."

Meeting the needs of participants

The training had to account for the fact that different regions present different kinds

of weather challenges, which affected the types of weather information participants wanted and needed.

“Those from Snoqualmie Pass have to maintain roads in continuous winter snow,” he said. “Those from Wenatchee experience intermittent snow, black ice, and frost. And in the Southwest region they are most likely to face not snow but rain-related erosion, landslides, and drainage issues.”

Value of weather information

The training participants were also mixed in their attitudes about the value and credibility of on-line weather information.

“About half the participants came with an open mind and hadn’t given a lot of thought to weather,” Steed said. “They didn’t feel that weather is crucial to their jobs, but neither did they think it is worthless. One quarter was skeptical of on-line weather information because they feel that they know from their experience what to expect on the roads without it. Another quarter had quite a bit of weather knowledge and experience with weather sources, and they asked questions that were surprising in their detail.”

Given feedback he received, Steed felt that class participants were likely to utilize on-line weather information at work more frequently than before.

New maintenance tools

Steed emphasized that he is trying to give maintenance personnel new tools to use—not telling them how to use those tools.

“Maintenance people resent the idea that anyone thinks they can tell them how to do their jobs better. I am not trying to tell them *how* to do their jobs but giving them information they can use *in* their jobs, information that was not available five years ago.

“Weather information is one of those marginal tools for maintenance personnel. It can tell them something beyond what they can gain by looking out the window, but its value may vary depending on their need and location. But on average, I believe that it will make their jobs more efficient and easier.

“It will take time for them to learn about weather information, time for them to incorporate it into their routines. With experience, they will realize that it can enhance their work.”

More sessions offered

Sessions were not available in all parts of Washington last year, but WSDOT plans to offer more this fall.

“I hope I’m involved,” Steed said. “Teaching the classes was a lot of fun.”



Late spring snow clearing operations near Chinook Pass on State Highway 410 in Washington State

Washington MDSS Will Provide Weather and Pavement Predictions

Scheduled for release this fall is Washington State’s version of a maintenance decision support system (MDSS) in the form of a weather warning system for state road maintenance operations personnel.

The Washington State Department of Transportation (WSDOT) system is intended to provide weather warnings with a short-term forecasting range of 0 to 36 hours. Smaller in scope and function than the federal prototype (see related article), it will include modeled pavement conditions but not pavement treatment recommendations.

According to Bill Brown, ITS Project Manager, WSDOT Advanced Technology Branch, the system will compare and integrate National Weather Service warnings with weather data from local MM5 forecasts. It will notify maintenance personnel when weather that might require maintenance activity is predicted.

Users can then consult the computerized system for further details about weather and

FHWA Prepares to Unveil Maintenance Decision Support System

To help road maintenance personnel keep our roads clear and safe in winter, the Federal Highway Administration (FHWA) will unveil its winter Maintenance Decision Support System (MDSS) functional prototype later this year.

The core modules of the system are intended as a starting point for the private sector in developing operational tools for various agencies with transportation interests, including state departments of transportation.

Weather, road condition, operational data

The focus of the federal functional prototype is to integrate environmental, road condition, and department of transportation (DOT) operational data, as well as DOT rules of practice, to provide support for winter road maintenance decisions, including decisions concerning snow plowing and chemical applications. Because it is a prototype, not all envisioned capabilities of a fully operational MDSS have been included.

In its current state, the MDSS prototype operates with a live data stream from several sources and is able to automatically generate weather forecasts at specific points, calculate road temperature and chemical concentrations for road maintenance routes, recommend treatment strategies based on predicted conditions, and allow users to perform "what if" calculations for multiple treatment options.

The prototype also provides decision support for monitoring stocks of chemicals and abrasives and crew shifts. In addition, users are able to view time series information for weather and road condition parameters.

The components of the prototype are intended to be further developed and supplied by private, value-added meteorological services (VAMS) as over-the-counter commercial products. As these products enter the marketplace, road operating agencies will be able to choose from a selection of alternative systems, integrate the best fit with other operational components, and deploy them.

Federal initiative

Paul Pisano, team leader of FHWA's Road Weather Management Program, explained that the federal government sees its role as a first-stage developer, setting national standards and making investments that are longer term and riskier than states or the private sector are willing to make. However, development has been a joint effort.

"We have been taking the first big step," Pisano said, "but not just by ourselves. It wouldn't have succeeded as it has without public and private partners."

The development of the prototype MDSS is part of the Surface Transportation Weather Decision Support Requirements (STWDSR) initiative. Mitretek Systems, Inc., is conducting the STWDSR initiative for the FHWA's Office of Transportation Operations Road Weather Management Program. Six national research centers are participating in the development:

- Army Cold Regions Research and Engineering Laboratory
- National Center for Atmospheric Research
- Massachusetts Institute of Technology—Lincoln Laboratory
- NOAA National Severe Storms Laboratory
- NOAA Environmental Technology Laboratory
- NOAA Forecast Systems Laboratory

Testing and review

Although an operational MDSS could be configured to provide decision support statewide, given time and resource constraints, the MDSS prototype was designed to function for four routes in Minnesota. The system was tested on a sample data set generated by a Minnesota winter storm in February 2002, and representatives from four state DOTs (Minnesota, New Hampshire, Utah, and Washington) have been meeting to review the results and provide feedback.

A formal review meeting in June 2002 included input by state DOTs and the participating federal laboratories, as well as private vendors. Their comments will affect the design of the MDSS prototype.

Future development

The stakeholder meeting in June also involved discussions about continuing funding of the STWDSR initiative and further development of prototype components.

Pisano explained that the expected role of FHWA will be to evaluate operational deployments and to foster further research and development of a generic MDSS. FHWA foresees that the MDSS will evolve, with feedback from various operational tests contributing to functional enhancements.

A formally chartered committee of stakeholders, including state DOTs, private-sector providers, academia, the national laboratories, and the FHWA, would guide these long-term development efforts.

"We don't see this just being a federal initiative," Pisano said. "It has to be a group of interested parties working together to continue to move forward. That's easier said than done, but I'm an idealist, so I'm going to believe that we can work together to do that."

More information

Two web sites provide excellent information on the STWDSR initiative:
http://www.rap.ucar.edu/projects/rdwx_mdss/index.html and <http://www.ops.fhwa.dot.gov/Weather/cases/MaintenanceManagement/Others/MDSS.htm>

pavement conditions, check with other sources if they desire, and make their own decisions about appropriate maintenance actions.

Operational tool

Although WSDOT already has an extensive road/weather information web site (www.wsdot.wa.gov/traffic), the new MDSS will differ in several important ways. First, whereas the Traffic and Weather web site is primarily designed for the public, allowing site visitors to begin with generalized, user-friendly information before reaching more detailed weather forecasts, the MDSS will be an operational tool tailored to maintenance needs.

Maintenance personnel most want to know where weather is happening, its type and intensity, and when and for how long road conditions will be affected by it. When they log onto the MDSS, their log-in information will prompt the system to immediately display a map of their region, color-coded with area-specific weather warnings. Another tool under consideration is the ability to zoom in to view weather and pavement condition forecasts for specific plow routes.



The MDSS also differs from the Traffic and Weather web site in that instead of maintenance personnel having to look for the information, the information will come to them, particularly alerts about predicted adverse weather.

Brown will not yet say exactly what users can expect to find on the computer screen,

but he will say that all products will be based on modeled data output that is verified with observational data. Developers are also working with fuzzy logic road condition modeling to potentially provide more advanced road condition information.

Pavement treatment recommendations

At this time, the ability to provide treatment recommendations such as plowing or de-icing is not a part of the system, but Brown sees WSDOT moving in that direction. To take that step, WSDOT regions will have to develop consistent databases of resources and operational practices. These could then be input into the MDSS to allow crew and materials to be monitored and analyzed.

In addition, observation gaps within the road/weather information system (RWIS) will need to be filled to provide enough data for the MDSS system to accurately predict the weather for all of the state's complex terrain.

These steps are already occurring in some areas. The North Central Region has been a pioneer in this effort, funding the creation of a site plan for RWIS. And with the recent addition of Ed Boselly as WSDOT's new Snow and Ice Program Manager, other regions are likely to follow.

But regardless of the expansion of these advanced tools, the project team still considers maintenance operators' experience to be the most important tool in making safe and reliable road maintenance decisions.

Review and release

A small meeting of six representatives from WSDOT's regions occurred in June 2002. The participants viewed the federal functional prototype, learned about what the Washington MDSS project team could deliver, and provided feedback on features and content. The state system delivered in fall 2002 will be based on those recommendations and feedback.

For more information about Washington's MDSS, contact Bill Brown,

511—Calls on New Travel/Weather information Line Will Ring Through Soon

Early this fall, a new public-service phone number, 511, will debut in Washington State. The purpose of 511 will be to provide various types of travel and weather information statewide.

In Phase I of the 511 implementation, begun in January, the Washington State Department of Transportation is developing access to its traffic information, including conges-

tion, construction, incidents, and mountain pass information, and will also connect callers to Washington State Ferries' information and reservation lines.

The source of much of the information will be the data from WSDOT's Traffic and Weather web site, which are updated continuously. Eldon L. Jacobson, WSDOT's 511 project manager, explained that a computer system is being developed to read information from WSDOT web sites and provide it over the phone.

"We are distributing existing information by another method," he said.

Weather information will also come from WSDOT's Traffic and Weather web site, although in phase I it will be limited to the mountain passes. Travelers will be able to learn about temperatures, elevations, road conditions, tire restrictions, and forecasts for that day and evening.

Natural language speech recognition

Because the system will employ natural language speech recognition, drivers will be able to seek information hands-free. The system will present callers with a menu of options and words to speak, such as "ferries," to access each option. It will prompt them when necessary to narrow answers to specific questions.

"Once travelers know the menu, they will be able to just speak a word to reach the information they want without having to listen to the whole menu," Jacobson said.

Incremental development

WSDOT will start out with 48 incoming phone lines in Phase I and intends to eventually have 144. To prepare for the new service phone companies around the state are reprogramming their computers to ensure that 511 calls are connected properly. WSDOT is also negotiating with cell-phone companies to offer the service without a surcharge.

In Phase II, Washington State Ferry information will be directly accessible, and Spanish will be added to the 511 language capabilities. Hood Canal floating bridge information will also be added if funding allows. Current 800 numbers will be phased out as the project proceeds.

Further capabilities may eventually be added. "Our philosophy is to start small and then expand," said Jacobson.

As additional public agencies such as transit develop an interest in being linked to 511, and if funding allows, telephone menus will be revised to include them. Eventually, the 511 service may offer even more, including tourism information, local incident reports, special events, links to roadside assistance, and information on local points

of interest.

“We didn’t want to start out too ambitiously and then have to deal with cost overruns,” Jacobson said. “Hopefully the system will be incrementally successful.”

National 511 deployment

Washington’s system will be one of many nationwide. In July 2000, the Federal Communications Commission (FCC) designated 511 as the United States’ national traveler information telephone number, leaving nearly all implementation issues and schedules to state and local agencies and telecommunication carriers.

The national 511 Deployment Coalition, comprising members from all levels and types of government agencies, various segments of the telecommunications industry, consultants, system integrators, and information service providers, has already published guidelines for the consistency and content of 511 services. These are intended to assure a minimum level of quality and to lay the foundation for ultimately establishing a consistent nationwide 511 service.

Washington is among 20 states that have received money to develop a system. For the first two years, Washington will receive about \$200,000 from federal grants and \$530,000 from state gas-tax revenue. For Phase II, WSDOT has applied for a \$400,000 grant from the Federal Highway Administration, and Jacobson hopes the state will match that amount.

More information

For more information about 511 in Washington, contact Eldon L. Jacobson, WSDOT 511 Project Manager, eldon@u.washington.edu, 206.685.3187.

Information about national 511 efforts can be found at the following sites:

<http://www.its.dot.gov/511/511.htm> and <http://www.itsa.org/511.html>

